

ENGINEERING REPORT

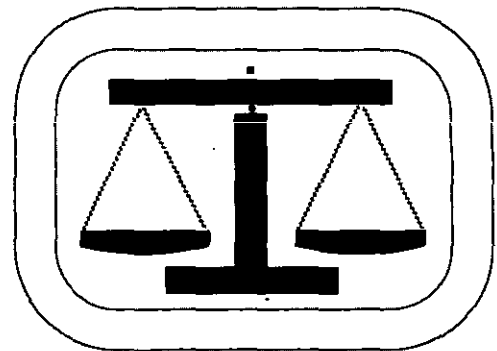
for

Contract DACW-33-81-C0030

Work Order Number 6

Environmental Investigation at Provincetown Harbor

Provincetown, Massachusetts



BRIGGS

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Chain of custody log

Figure 1 Sample Location Map

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1.1 AUTHORIZATION

The work reported herein was performed under contract DACW-33-81-C-0030, Work Order No. 6 dated 16 April 1981.

1.2 PURPOSE

The purpose of this work was to obtain bottom sediment samples and water samples for bulk elutriate and chemical testing from three locations within Provincetown Harbor as shown on the attached Figure 1. To accomplish this work three(3) gravity core samples, were attempted, thirteen (13) Smith-McIntyre grabs recovered, and fifteen (15) gallons of water were obtained from the three test areas.

1.3 SCOPE OF INVESTIGATION

Samples were taken at the locations as shown on Figure 1. The project was conducted during two shifts on Wednesday 29 April 1981. The field exploration logs for all the attempted samples are included as Appendix A to this report.

Location A - One gravity core sample was attempted, no recovery. Seven Smith-McIntyre grab samples were recovered spaced approximately five feet apart. Seven gallons of water for elutriate testing were obtained.

Location B - One gravity core sample was attempted, no recovery. Four Smith-McIntyre grab samples were recovered spaced approximately five feet apart. Four gallons of water for elutriate testing were obtained.

Location C - One gravity core sample was attempted, no recovery. Two Smith-McIntyre grab samples were recovered spaced approximately five feet apart. Four gallons of water were obtained for elutriate testing.

1.4 QUALITY ASSURANCE

We hereby certify that the following equipment, equipment preparation procedures and sampling procedures were used to perform the sampling outlined in this report:

Equipment

Sediment Sampling:

A gravity coring sampler containing a 2-5/8 inch ID minimum diameter plastic core liner insert with a vacuum assembly for containing the sample was used. All assembly surfaces exposed to the sample were teflon coated prior to use. The core liners used are made of cellulose acetate butyrate and the end caps are tight fitting polyethylene.

A Smith-McIntyre grab sampler was used to obtain the bottom grab samples. The samples were secured in air tight heavy duty polyethylene bags prior to placement in covered plastic buckets.

Water Sampling:

Two Niskin type water samplers were used: a four liter PVC sampler and a four liter stainless steel sampler both with messenger triggers riding on 3/8 inch Dacron retrieval cable. On both samplers, no metal parts were exposed to the sample.

Water Samples were retained in either one gallon polyethylene containers with polyethylene screw caps or one gallon glass jugs with teflon-lined screw caps.

Equipment Preparation Procedure:

All the core liners were washed with ultrapure distilled water and the ends capped prior to use. The Smith-McIntyre grab was washed with spectrographic grade hexane in the lab before use on the project. The stainless steel water sampler was rinsed with spectrographic grade hexane and the PVC water sampler was prepared by first washing thoroughly with a detergent, rinsing with tap water, soaking in a 10% HCL solution for four hours and finally being rinsed with metal free (ultrapure) distilled water.

Sampling Procedure:

The sampling stations for elutriate, bulk chemical and physical testing were located by means of visual sights. Gravity cores were attempted and Smith McIntyre grab samples were taken as specified by the work order.

Smith-McIntyre grab samples were sealed in polyethylene bags, with as much air removed as possible before being placed in sealed plastic buckets.

Water samples were obtained as directed in the work order. Both the polyethylene and glass containers were filled to overflowing before being tightly capped.

Smith-McIntyre grab samples and water samples were maintained between 1.0 and 4.0 C from the time of sampling to delivery to the NED laboratory in Waltham MA. A chain of custody log documenting the disposition of the samples is included with this report. Sampling and storage procedures were carefully monitored by our on-site Quality Assurance inspector, Mr. Jeffrey Shelkey, to insure strict adherence to the specifications.

The following designations were used to identify the various type of samples obtained for testing.

Gravity cores:	PF (logs only)
Smith-McIntyre grab:	GA
Water Samples:	EW

Smith-McIntyre grab samples and water bottles were tagged with labels in waterproof bags containing the following information:

- Project identification
- Date and time of sampling
- Location identification and sample designation
- Core liner numbers and core liner depths
- Signature of inspector



Certified 1 May 1981

A handwritten signature in dark ink, appearing to read "David S. Campbell", written over a horizontal line.

David S. Campbell P.E.
Massachusetts No. 29145

BRIGGS ENGINEERING CORPORATION

Chain of Custody Log

Project: Provincetown Harbor - W.O. # 6

Items: Tubes None

Bottles 15

Bag Samples 13

Other Field Exploration Logs 29

<u>Date & Time Received</u>	<u>Date & Time Transferred</u>	<u>Comments</u>	<u>Custodian</u>
<u>As sampled 29 April 81</u>	<u>29 April 81 2355</u>	<u>Briggs</u>	<u>J. D. Shelkey</u>
<u>29 April 81 2355</u>	<u>30 April 81 1200</u>	<u>EGIG</u>	<u>D.R. Levin</u>
<u>30 April 81 1200</u>	<u>30 April 1400</u>	<u>Briggs</u>	<u>J.B. Shelkey</u>
<u>30 April 81 1400</u>	<u></u>	<u>NEDED-LW</u>	<u>M. Carroll</u>
<u></u>	<u></u>	<u></u>	<u></u>

APPENDIX A

Field Exploration Logs

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☒ WATER ☐ OTHER ☐SAMPLE NO. A-PF-1 DESIGNATION: A-PF-1COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐SOUNDING: 7'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 5.0' MLWNUMBER OF ATTEMPTS: 2MATERIAL DESCRIPTION: Bottom sandsMATERIAL DEPTH: -SAMPLE DISPOSITION: BAG ☐ JAR ☐ LINER ☐ DISCARD ☐BARREL LENGTH: 8' & 3' WEIGHT LBS: 175 FREE FALL: 0

WATER SAMPLES:

NUMBER: GALLONS ☐ TEMPERATURE ☐QUARTS ☐ DOD ☐PINTS ☐ SALINITY ☐JULIAN DATE: 119 SECCHI DISC READINGS: pH ☐24 hr TIME: 1158 REDOX ☐SEA STATE: 01 BLACK =WEATHER CODE 20 WHITE =OPERATIONAL DIFFICULTIES Made 2 attempts-hard sand-no penetrationNO. OF SAMPLES SHIPPED: 0INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☐ OTHER ☒SAMPLE NO. A-GA-1 DESIGNATION: A-GA-1COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 7'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 6.4' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Bottom sandsMATERIAL DEPTH: Surface grabSAMPLE DISPOSITION: BAG ☒ JAR ☐ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: GALLONS TEMPERATURE QUARTS DOD PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1240 REDOX SEA STATE: 01 BLACK = WEATHER CODE 20 WHITE = OPERATIONAL DIFFICULTIES Smith-McIntyre grabNO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

ENVIRONMENTAL EXPLORATION LOG

INSPECTOR: Jeffrey Shelkey

ENVIRONMENTAL EXPLORATION LOG

INSPECTOR: Jeffrey B. Shelkey

ENVIRONMENTAL EXPLORATION LOG

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INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☐ OTHER ☒SAMPLE NO. A-GA-7 DESIGNATION: A-GA-7COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 7'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 6.8' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Bottom sandMATERIAL DEPTH: Surface grabSAMPLE DISPOSITION: BAG ☒ JAR ☐ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: GALLONS TEMPERATURE QUARTS DOD PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1316 REDOX SEA STATE: 02 BLACK = WEATHER CODE 43 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. A-EW-1 DESIGNATION: A-EW-1COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 7'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 6.9' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS 1 TEMPERATURE QUARTS DOD PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1325 REDOX SEA STATE: 02 BLACK = WEATHER CODE 43 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. A-EW-2 DESIGNATION: A-EW-2COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 7'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 7.0' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE QUARTS ☐ DOD PINTS ☐ SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1337 REDOX SEA STATE: 02 BLACK = WEATHER CODE 43 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. A-EW-3 DESIGNATION: A-EW-3COORDINATES: NORTH ☐ EAST ☐

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 7'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 7.0' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: ☐ WEIGHT LBS: ☐ FREE FALL: ☐

WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE ☐QUARTS ☐ DOD ☐PINTS ☐ SALINITY ☐JULIAN DATE: 119 SECCHI DISC READINGS: pH ☐24 hr TIME: 1345 REDOX ☐SEA STATE: 02 BLACK = ☐WEATHER CODE 43 WHITE = ☐OPERATIONAL DIFFICULTIES ☐NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. A-EW-4 DESIGNATION: A-EW-4COORDINATES: NORTH ☐ EAST ☐

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 7'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 7.0' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: ☐ WEIGHT LBS: ☐ FREE FALL: ☐

WATER SAMPLES:

NUMBER: 1 GALLONS 1 TEMPERATURE ☐QUARTS ☐ DOD ☐PINTS ☐ SALINITY ☐JULIAN DATE: 119 SECCHI DISC READINGS: pH ☐24 hr TIME: 1403 REDOX ☐SEA STATE: 02 BLACK = ☐WEATHER CODE 43 WHITE = ☐OPERATIONAL DIFFICULTIES ☐NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. A-EW-5 DESIGNATION: A-EW-5COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐SOUNDING: 5LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐

At anchor

REDUCED SOUNDING: 4.7' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Water sample S-S and glassMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE QUARTS ☐ DOD PINTS ☐ SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1440 REDOX SEA STATE: 02 BLACK = WEATHER CODE 43 WHITE =

fog

OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. A-EW-6 DESIGNATION: A-EW-6COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐SOUNDING: 5LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐

At anchor

REDUCED SOUNDING: 4.6' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Water sample S-Steel and glassMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE QUARTS ☐ DOD PINTS ☐ SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1450 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

ENVIRONMENTAL EXPLORATION LOG

INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☒ WATER ☐ OTHER ☐SAMPLE NO. B-PF-1 DESIGNATION: B-PF-1COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐SOUNDING: 17'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 16.2' MLWNUMBER OF ATTEMPTS: 2MATERIAL DESCRIPTION: Bottom sandsMATERIAL DEPTH: SAMPLE DISPOSITION: BAG ☐ JAR ☐ LINER ☐ DISCARD ☐BARREL LENGTH: 8' & 3' WEIGHT LBS: 175 FREE FALL: 0

WATER SAMPLES:

NUMBER: GALLONS ☐ TEMPERATURE ☐QUARTS ☐ DOD ☐PINTS ☐ SALINITY ☐JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1500 REDOX SEA STATE: 02 BLACK =WEATHER CODE 01 WHITE =OPERATIONAL DIFFICULTIES Made 2 attempts-hard sand-no penetrationNO. OF SAMPLES SHIPPED: 0INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☐ OTHER ☒SAMPLE NO. B-GA-1 DESIGNATION: B-GA-1COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT
RANGES ☒
SEXTANT
VISUAL ☒
LORAN C SOUNDING: 17'
LEAD LINE
FATHOMETER ☒
TIDEBOARD
TIDE TABLE
TIDE CURVE
REDUCED SOUNDING: 16.2' MLWNUMBER OF ATTEMPTS: 2MATERIAL DESCRIPTION: Bottom sandMATERIAL DEPTH: Surface grabSAMPLE DISPOSITION: BAG ☒ JAR ☐ LINER ☐ DISCARD BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: GALLONS TEMPERATURE
QUARTS DOD
PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1510 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

ENVIRONMENTAL EXPLORATION LOG

INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☐ OTHER ☒SAMPLE NO. B-GA-3 DESIGNATION: B-GA-3COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐At anchor ☐SOUNDING: 17'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 16.9' MLWNUMBER OF ATTEMPTS: 2MATERIAL DESCRIPTION: Bottom sandsMATERIAL DEPTH: Surface grabsSAMPLE DISPOSITION: BAG ☒ JAR ☐ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: GALLONS TEMPERATURE QUARTS DOD PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1522 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

ENVIRONMENTAL EXPLORATION LOG

INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. B-EW-1 DESIGNATION: B-EW-1COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 17'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 14.0' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE QUARTS ☐ DOD PINTS ☐ SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1600 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981SAMPLER TYPE:
KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. B-EW-2 DESIGNATION: B-EW-2COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 17'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 13.2' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE QUARTS ☐ DOD PINTS ☐ SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1605 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. B-EW-3 DESIGNATION: B-EW-3COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

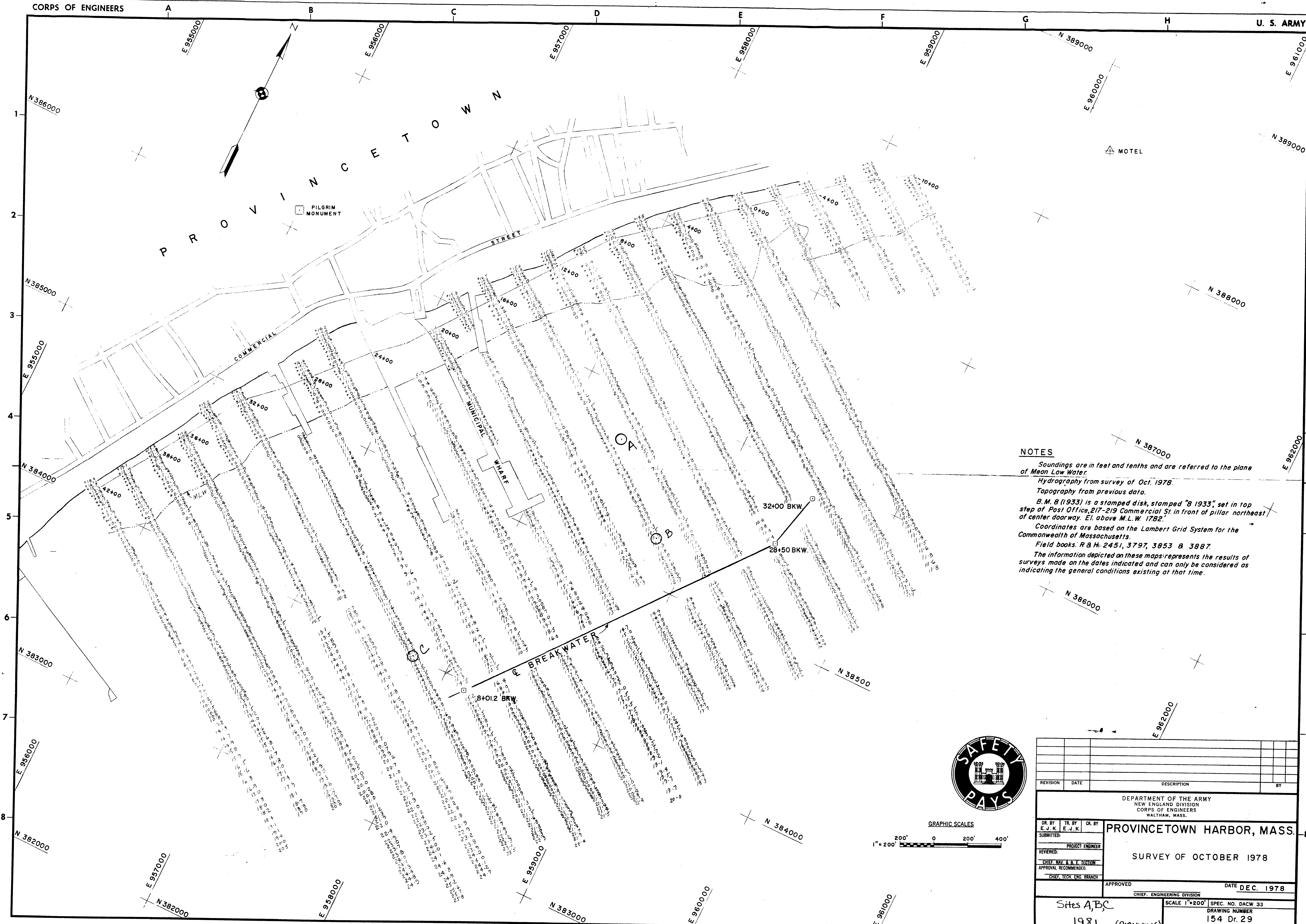
SOUNDING: 20'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 16.2' MLWNUMBER OF ATTEMPTS: 2MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE QUARTS ☐ DOD PINTS ☐ SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1610 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

ENVIRONMENTAL EXPLORATION LOG

INSPECTOR: Jeffrey B. Shelkey



GRAPHIC SCALES

1" = 200'

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS WALTHAM, MASS.			
PROVINCETOWN HARBOR, MASS.			
SURVEY OF OCTOBER 1978			
DR. BY E. J. K.	TR. BY E. J. K.	CR. BY E. J. K.	DATE DEC. 1978
SUBMITTED: PROJECT ENGINEER			APPROVED CHIEF, ENGINEERING DIVISION
REVIEWED: CHIEF, NAV. & B. E. SECTION			DATE DEC. 1978
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH			DATE DEC. 1978
SITES A, B, C 1981 (PLANNING)			SCALE 1"=200' SPEC. NO. DACW 33 DRAWING NUMBER 154 Dr. 29 SHEET 1

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☒ WATER ☐ OTHER ☐SAMPLE NO. C-PF-1 DESIGNATION: C-PF-1COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐SOUNDING: 20'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 13.4' MLWNUMBER OF ATTEMPTS: 2MATERIAL DESCRIPTION: Bottom sandsMATERIAL DEPTH: SAMPLE DISPOSITION: BAG ☐ JAR ☐ LINER ☐ DISCARD ☐BARREL LENGTH: 8' & 3' WEIGHT LBS: 175 FREE FALL: 0

WATER SAMPLES:

NUMBER: GALLONS TEMPERATURE QUARTS DOD PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1700 REDOX SEA STATE: 02 BLACK =WEATHER CODE 01 WHITE =OPERATIONAL DIFFICULTIES Made 2 attempts-hard sand-no penetrationNO. OF SAMPLES SHIPPED: 0INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☐ OTHER ☒SAMPLE NO. C-GA-1 DESIGNATION: C-GA-1COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐SOUNDING: 20LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐

At anchor

REDUCED SOUNDING: 13.4' MLWNUMBER OF ATTEMPTS: 5MATERIAL DESCRIPTION: Bottom sandMATERIAL DEPTH: Surface grabSAMPLE DISPOSITION: BAG ☒ JAR ☐ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: GALLONS TEMPERATURE QUARTS DOD PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1711 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES 2 attempts w/ gravity corer-no penetration
shell bed-grab not closing fullyNO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☐ OTHER ☒SAMPLE NO. C-GA-2 DESIGNATION: C-GA-2COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐SOUNDING: 20LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐Moved 150' closer to
breakwaterREDUCED SOUNDING: 12.2' MLWNUMBER OF ATTEMPTS: 3MATERIAL DESCRIPTION: Bottom sandsMATERIAL DEPTH: SAMPLE DISPOSITION: BAG ☒ JAR ☐ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: GALLONS TEMPERATURE QUARTS DOD PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1800 REDOX SEA STATE: 2 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES Smith-McIntyre grab not closing due toNO. OF SAMPLES SHIPPED: 1 coarse gravel and sandINSPECTOR: Jeffrey R. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. C-EW-1 DESIGNATION: C-EW-1COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT RANGES XSEXTANT VISUAL XLORAN C SOUNDING: 20LEAD LINE FATHOMETER XTIDEBOARD TIDE TABLE TIDE CURVE REDUCED SOUNDING: 14.0' MLWNUMBER OF ATTEMPTS: 2MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS X TEMPERATURE QUARTS DOD PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1630 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. C-EW-2 DESIGNATION: C-EW-2COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT RANGES ☒SEXTANT VISUAL ☒LORAN C

At anchor

SOUNDING: 20LEAD LINE FATHOMETER ☒TIDEBOARD TIDE TABLE TIDE CURVE REDUCED SOUNDING: 14.0' MLWNUMBER OF ATTEMPTS: 1MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE QUARTS DOD PINTS SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1645 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. C-EW-3 DESIGNATION: C-EW-3COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 20'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 14.0' MLWNUMBER OF ATTEMPTS: 2MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE QUARTS ☐ DOD PINTS ☐ SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1650 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

BRIGGS ENGINEERING CORPORATION

ENVIRONMENTAL EXPLORATION LOG

PROJECT: Provincetown Harbor DATE: 29 April 1981

SAMPLER TYPE:

KULLENBERG ☐ PISTON ☐ DREDGE ☐ CORE ☐ WATER ☒ OTHER ☐SAMPLE NO. C-EW-4 DESIGNATION: C-EW-4COORDINATES: NORTH EAST

LOCATION METHOD:

TRANSIT ☐RANGES ☒SEXTANT ☐VISUAL ☒LORAN C ☐

At anchor

SOUNDING: 20'LEAD LINE ☐FATHOMETER ☒TIDEBOARD ☐TIDE TABLE ☐TIDE CURVE ☐REDUCED SOUNDING: 14.0' MLWNUMBER OF ATTEMPTS: 2MATERIAL DESCRIPTION: Water sampleMATERIAL DEPTH: 3' above bottomSAMPLE DISPOSITION: BAG ☐ JAR ☒ LINER ☐ DISCARD ☐BARREL LENGTH: WEIGHT LBS: FREE FALL:

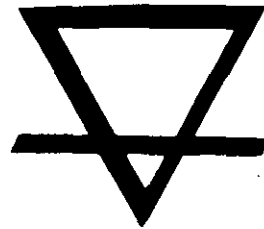
WATER SAMPLES:

NUMBER: 1 GALLONS ☒ TEMPERATURE QUARTS ☐ DOD PINTS ☐ SALINITY JULIAN DATE: 119 SECCHI DISC READINGS: pH 24 hr TIME: 1655 REDOX SEA STATE: 02 BLACK = WEATHER CODE 01 WHITE = OPERATIONAL DIFFICULTIES NO. OF SAMPLES SHIPPED: 1INSPECTOR: Jeffrey B. Shelkey

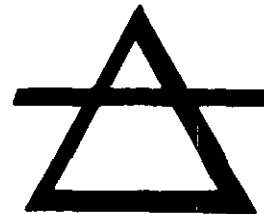


In ancient times
Greek and Hindu philosophers
believed that there were
four elements in the material universe
— EARTH, AIR, FIRE and WATER.

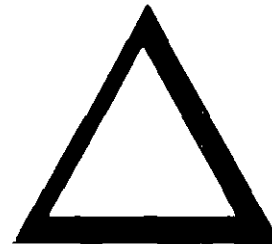
Over the years
man's knowledge has expanded
and the world of materials
is now known to be extremely complex.
The unravelling of these complexities
is the continuing goal of
Briggs Engineering & Testing Company.



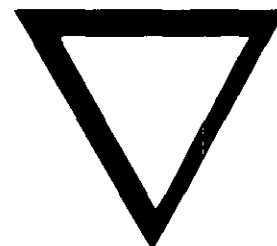
EARTH



AIR

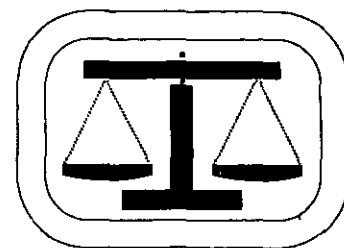


FIRE



WATER

BRIGGS



Engineering and Testing

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